Fission of Actinides induced by Neutrons at n-ToF

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The development as well as the design of new nuclear reactors require a more precise knowledge of nuclear data than presently available. Among urgent needs are fission cross sections of actinides which had not been measured with high precision in the past, since they were of minor importance for the present nuclear reactors. The n-ToF facility at CERN allows precise measurements due to its long flight path (185 m) and its high neutron flux delivered in a very short time, particularly interesting for the study of radioactive isotopes.

Fission cross sections are obtained by detecting the two fission fragments in coincidence with PPAC detectors (Parallel Plate Avalanche Counters). Such coincident measurements are interesting in particular at high neutron energies because they allow to disentangle fission from other reactions which start to appear at neutron energies above a few MeV. As a matter of fact, our fission measurements have been realized from 1 eV till energies above 100 MeV.

Measurements have been performed first for isotopes which are of interest for the thorium cycle : ^{232}Th, ^{233}U, ^{234}U. In addition ^{nat}Pb and ^{209}Bi have also been measured as they might be important for subcritical reactors in which they could be used as spallation targets and for cooling. Concerning minor actinides ^{237}Np has also been measured. All measurements are performed in reference to ^{235}U and ^{238}U permanently present in the stack of targets.

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